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Arends

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(54) **ADAPTABLE TRAILER HITCH AND MOUNTING SYSTEM**

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B60D 1/14 (2006.01)

(52) **U.S. Cl.**
USPC **280/477**; 280/511

(58) **Field of Classification Search**
USPC 280/477, 511
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,183,548	A *	1/1980	Schneckloth	280/433
6,089,590	A *	7/2000	Bowers	280/477
6,179,318	B1 *	1/2001	Howard	280/477
7,731,217	B2 *	6/2010	Stutts	280/477

OTHER PUBLICATIONS

B&W; B&W Defender Gooseneck Coupler; Item No. N14-3411; http://tweetys.com/band-w-defender-locking-gooseneck-coupler.aspx; p. 1; Apr. 7, 2012.

* cited by examiner

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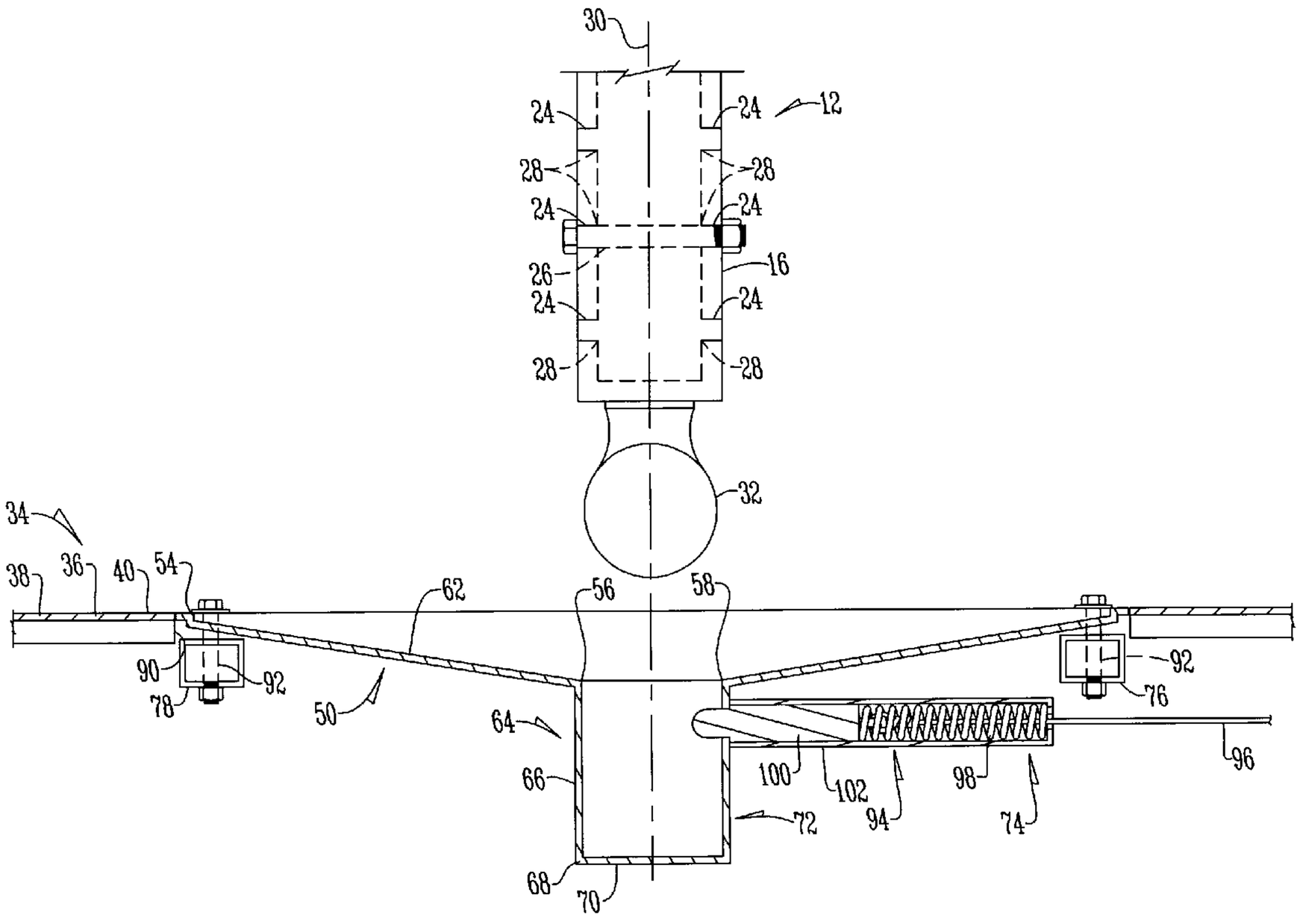
(57) **ABSTRACT**

A trailer and hitch mounting system that includes a hitch insert assembly that is attached to a hitch attachment of a trailer and additionally has a hitch mount. A mounting plate assembly has a mounting plate that is secured to the bed of a truck and has a frustoconically shaped hitch guide with an angled surface that receives and is engaged by the hitch mount in order to guide the hitch mount toward an opening within the hitch guide to place the hitch mount at a predetermined location for securing the trailer to a truck.

13 Claims, 4 Drawing Sheets



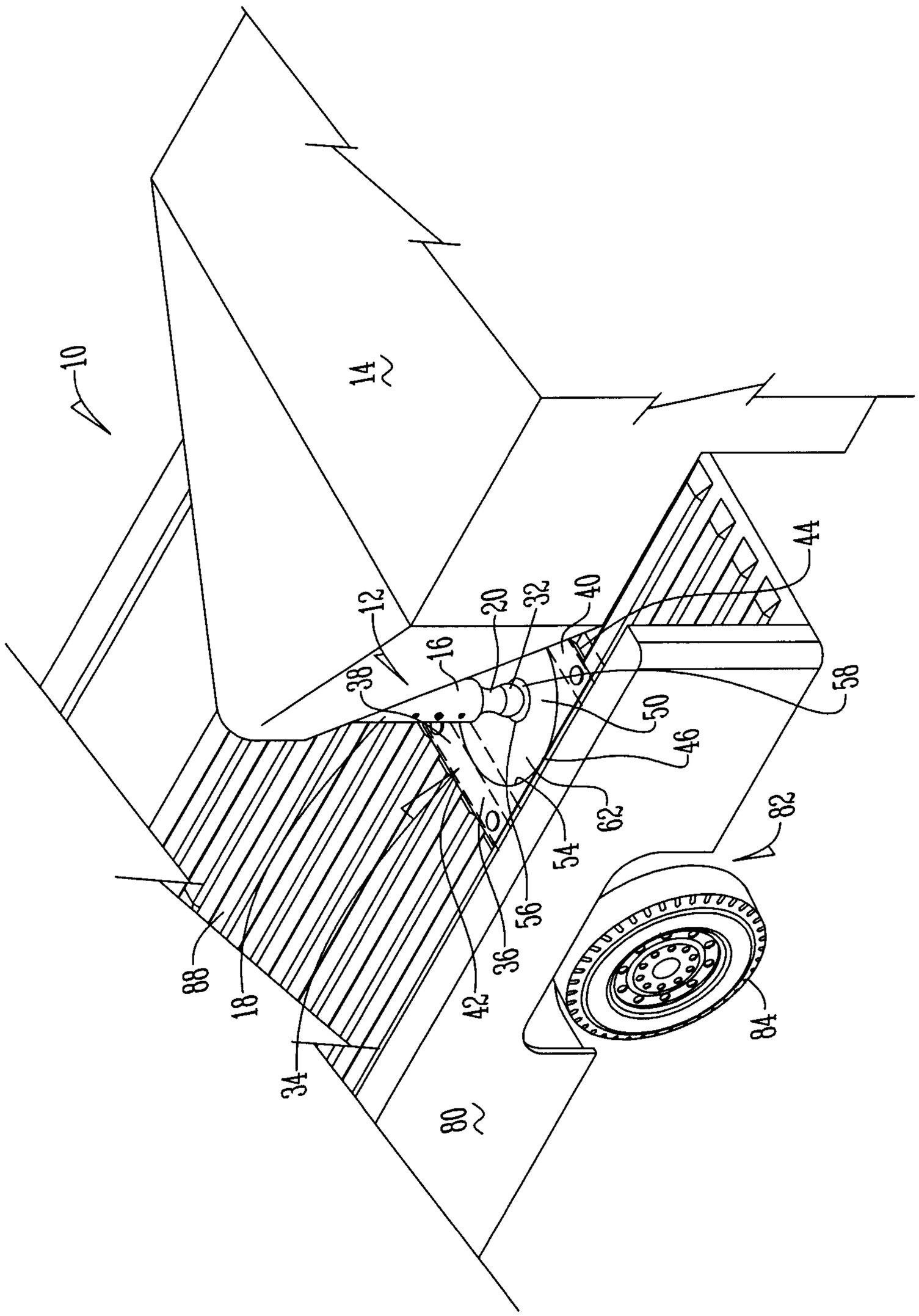


Fig. 1

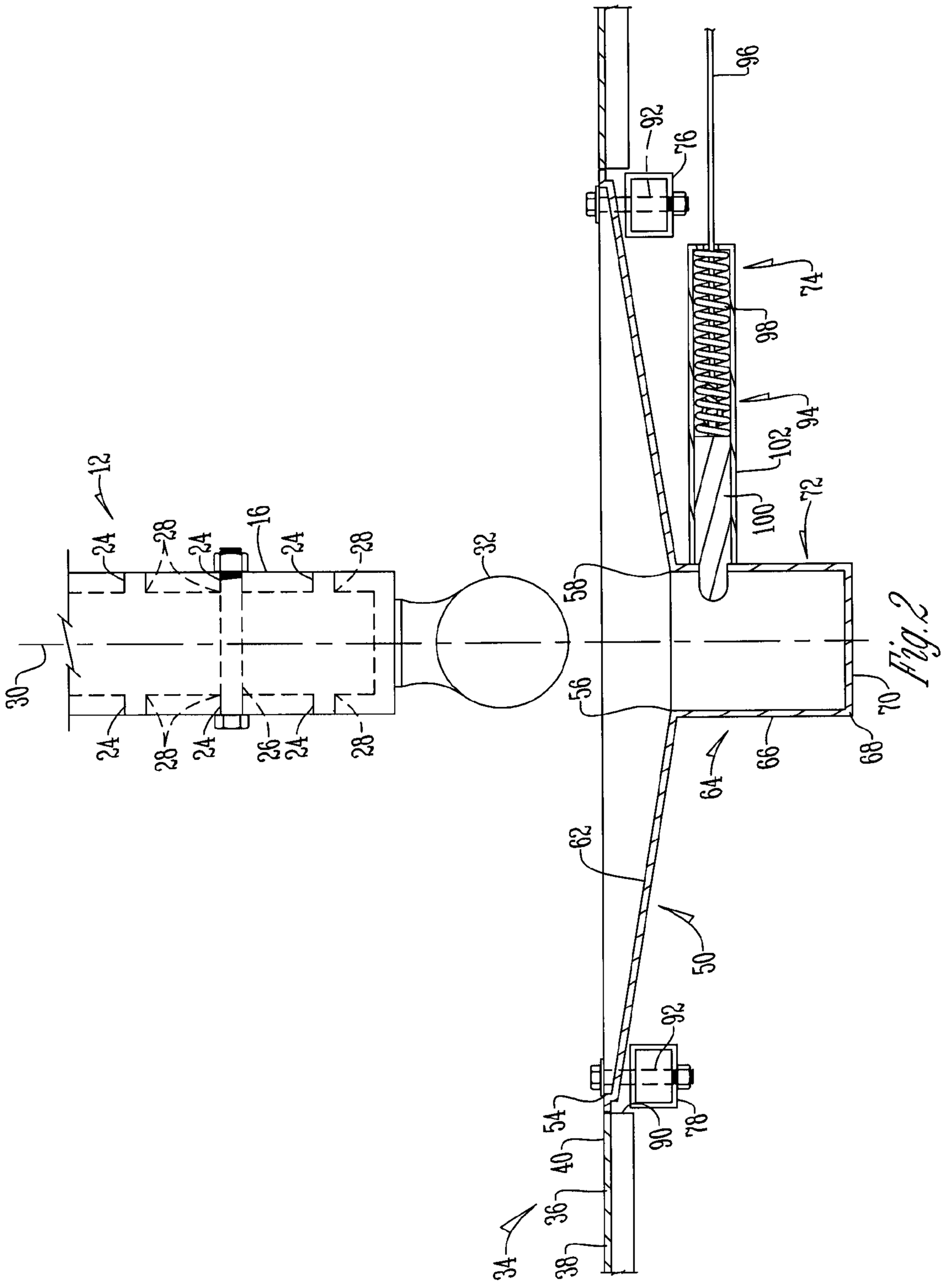

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Fig. 2

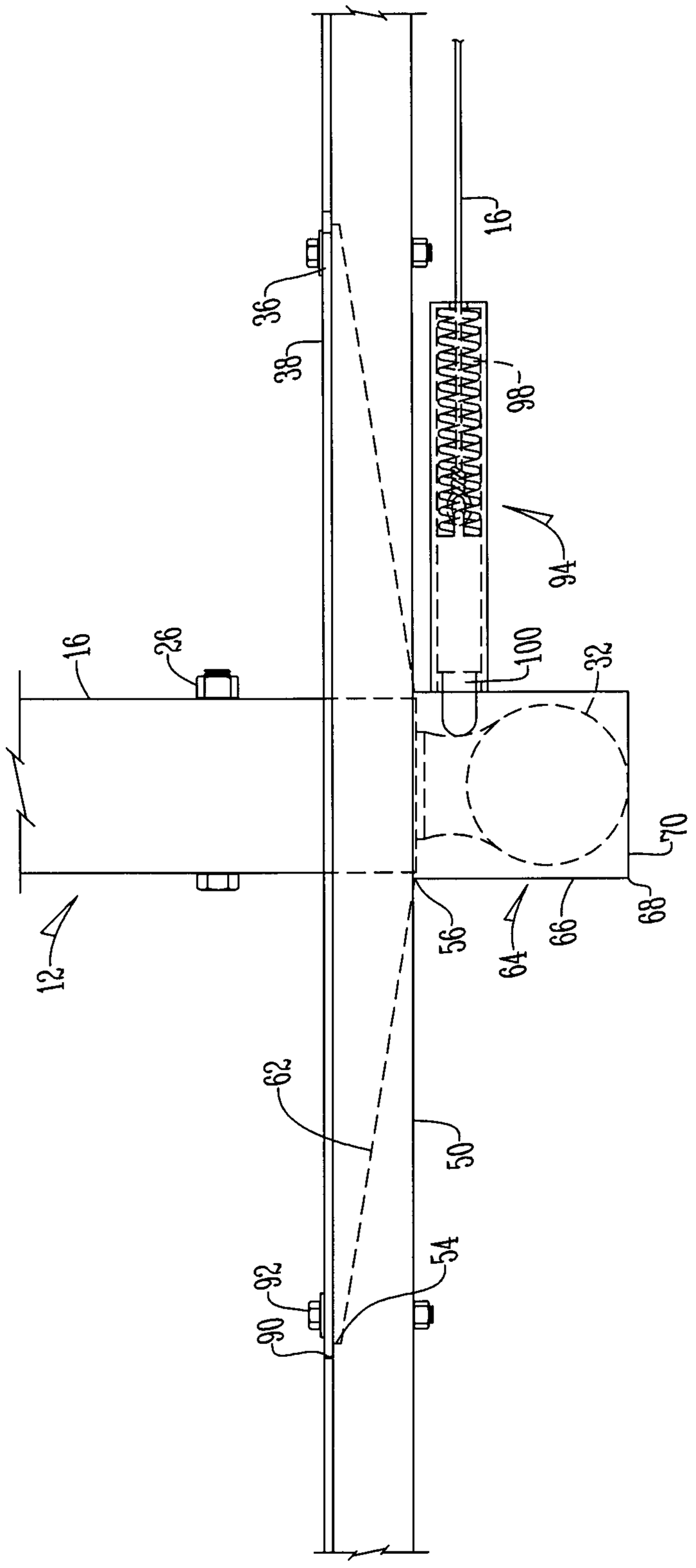

Fig. 3

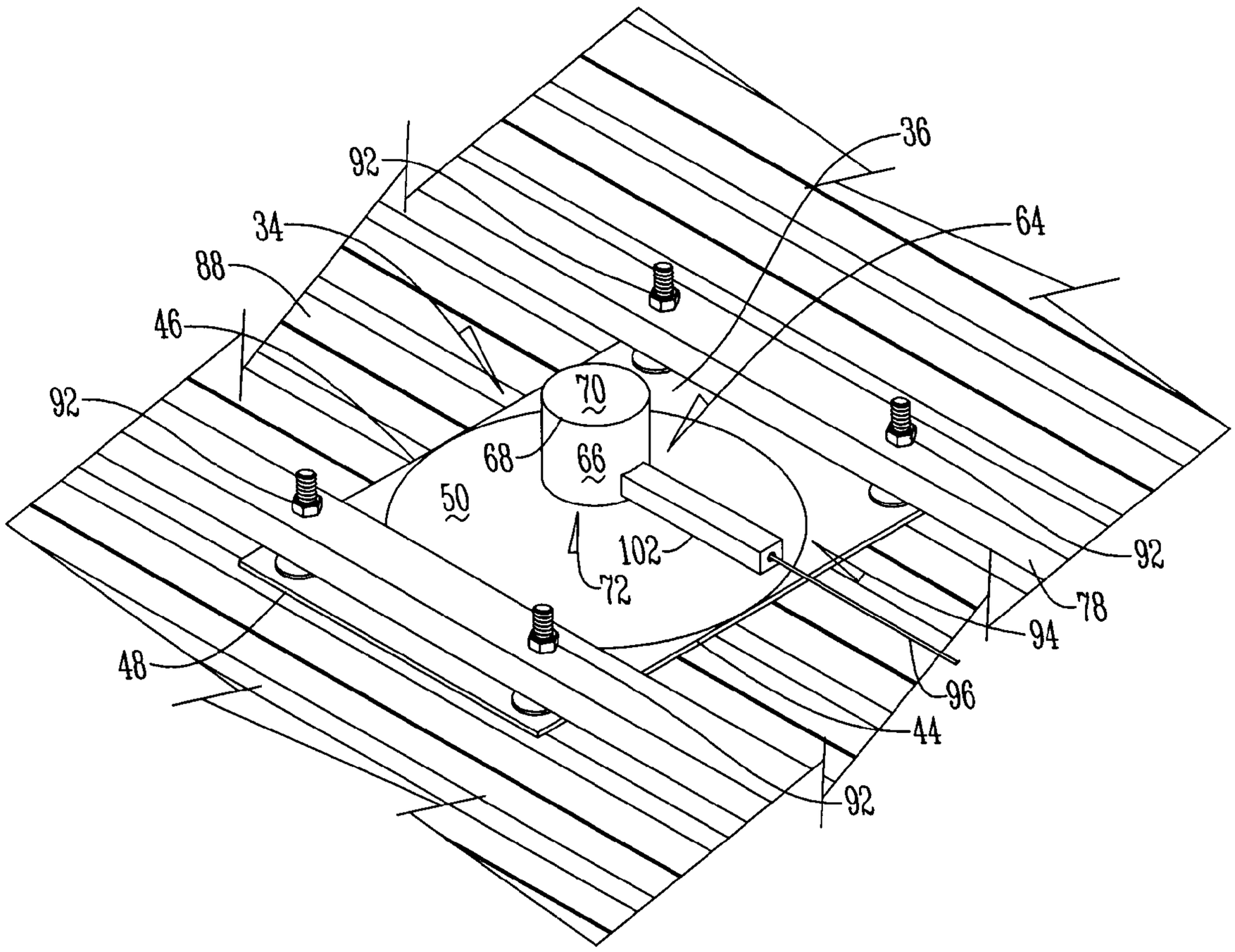

Fig. 4

ADAPTABLE TRAILER HITCH AND MOUNTING SYSTEM

CROSS REFERENCE TO RELATED APPLICATION

This application claims the benefit of U.S. Provisional Application No. 61/474,333 filed Apr. 12, 2011.

BACKGROUND OF THE INVENTION

This invention is directed toward a trailer hitch and hitch mounting system. More specifically, and without limitation, this invention relates to an adaptable and improved trailer hitch and mounting system incorporated into a standard trailer and truck.

Various types of trailers are known and utilized for hauling a wide variety of items due to their ability to haul loads which are too large in either volume or size to be accommodated by a truck. Many types of trailers, including those commonly referred to as having a "gooseneck", are characterized by a raised mounting structure designed to be mounted to a mounting structure with a ball hitch installed into the bed of a truck.

Although the present mounting structure adequately provides a secure connection between the trailer and the truck, successfully mounting the trailer to the truck's mounting structure and ball hitch is often difficult, time consuming, and frustrating. Specifically, the current gooseneck hitch system consists of a standard two foot tube that inserts into the trailer with an attached locking mechanism to lock the trailer into place on a typical ball hitch mounted to the bed of a truck. Given that standard sized ball hitches commonly have a diameter no larger than two and a half inches, the present system requires that the hitch tube of the trailer and the ball hitch of the truck are precisely aligned with very little margin for error to ensure that ball hitch is received within the trailer hitch once the trailer is lowered onto the mounting structure. Thus, achieving a proper mounting alignment often requires repeatedly re-positioning the truck to achieve alignment with the trailer or a second person outside of the vehicle acting as a spotter to provide the operator of the truck with directions.

Furthermore, currently known mounting systems as described above require a ball hitch to be installed protruding upward from the bed of the truck, with many additionally requiring further structural components such as supporting plates and rails to be installed into the bed of the truck to provide sufficient structural support for the ball hitch and associated locking mechanisms. Thus, currently known systems not only are characterized by difficulties in mounting the trailer to the truck's mounting structure and ball hitch, but also compromise the utility of the truck itself by requiring a ball hitch and associated mounting structure to occupy and interfere with the bed space of the truck. As a result, there exists a need in the art that addresses these problems.

Therefore a primary object of this invention is to provide an adaptable and improved trailer hitch and mounting system that provides an automatic, quick, and easy mounting connection between the trailer and the truck.

It is yet another object of this invention to provide an adaptable and improved trailer hitch and mounting system that automatically guides the trailer hitch into a mounting connection with the truck.

It is a further object of this invention to provide an adaptable and improved trailer hitch and mounting system that is sized to be used with and incorporated into a standard trailer.

These and other objects, features or advantages of the present invention will become apparent from the specification and claims.

BRIEF SUMMARY OF THE INVENTION

A trailer hitch and mounting system and a method of securing a trailer to a truck utilizing the same. The system includes a hitch insert assembly that is attached to a hitch attachment of a trailer and has a hitch mount. A mounting plate assembly has a mounting plate that is secured to the bed of the truck and additionally has a hitch guide that has an angled surface that receives and is engaged by the hitch mount to guide the hitch mount toward an opening at the bottom of the hitch guide so that the hitch mount is placed in a predetermined location for securing the trailer to the truck.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a cut-away perspective view of a trailer hitch and mounting system with a hitch insert assembly engaging an angled surface of a hitch guide of a mounting plate assembly;

FIG. **2** is a side sectional view of a hitch insert assembly and a mounting plate assembly of a trailer hitch and mounting system;

FIG. **3** is a side plan view of a hitch insert assembly disposed within a mounting plate assembly at a predetermined location; and

FIG. **4** is a cut-away bottom perspective view of a mounting plate assembly.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the figures, an adaptable and improved trailer hitch and mounting system **10** includes a hitch insert assembly **12** which is sized to be integrated into a standard trailer **14**. The hitch insert assembly **12** includes a hitch insert **16**. The hitch insert **16** is an elongated bar or hollow cylindrical tube which extends longitudinally from an upper end **18** to a lower end **20**. The hitch insert **18** is of any size adequate to be secured to a standard hitch attachment **12** of a trailer **14**.

Two or more insertion holes **24** extend laterally through the hitch insert **16**. In one embodiment, three insertion holes **24** are provided. The insertion holes **24** are sized to receive a connection pin **26** disposed through both the insertion holes **24** and the correspondingly aligned insertion holes **28** disposed through the hitch attachment **22** of a trailer **14**. The insertion holes **24** of the hitch insert **16** are positioned at pre-defined increments along the hitch insert's central vertical axis **30** such that the insertion holes **24** of the hitch insert **16** matingly align with corresponding insertion holes **28** disposed through the hitch attachment **22** of a trailer **14**. Thus, the mounting height of the trailer **14** can be adjusted by telescopically extending or retracting the hitch insert **16** within the hitch attachment **22** of a trailer **14**. Also included in the hitch insert assembly **12** is a hitch mount **32** affixed to the lower end **20** of the hitch insert **16**. In a preferred embodiment, the hitch mount **32** is a ball mount.

A mounting plate assembly **34** is also provided as part of the mounting system **10**. The mounting plate assembly **34** includes a mounting plate **36** having an outer frame **38** with a flat, planar upper surface **40** and additionally includes a front edge **42**, a rear edge **44**, and side edges **46** and **48**. Disposed within the outer frame **38** is a hitch guide **50**. The hitch guide **50** is comprised of an angled, bowl-shaped, or frustoconical cross section extending downward from the upper surface **40**

of the mounting plate's outer frame **38** into the interior of the mounting plate **36** in between the outer frame **38** and the interior hitch housing. Specifically, the hitch guide **50** includes an upper edge **54** which is on the upper surface **40** of the outer frame **38** adjacent to the front **40**, rear **44**, and side edges **46** and **48** of the outer frame **38** and a lower or terminal edge **56** which forms an opening **58** in the center of the mounting plate **36**. The hitch guide **50** further is comprised of a hitch guide surface which extends from the upper edge **54** to the lower or terminal edge **56** of the hitch guide **50** to define an angled surface **62** extending downwardly at an angle within the interior of the mounting plate to define a centrally located opening **58** within the interior of the mounting plate **36**.

A hitch housing **64** is disposed within the central opening **58** of the mounting plate **36**. The hitch housing **64** includes side walls **66** extending downward from the lower edge **56** of the hitch guide **50** to terminal ends **68** which are attached to a lower base plate **70** to form a cup-shaped housing **72** below the angled hitch guide **50** at the interior of the mounting plate **36** for receiving the hitch mount **32** within the interior of the hitch housing **64**. In a preferred embodiment, dimensions of the side walls **66** and the base plate **70** are sized to receive a standard sized hitch mount **32** within the hitch housing **64**.

A mounting assembly is also provided as part of the mounting plate assembly **34** and has first and second mounting rails **76** and **78** that extend laterally or perpendicular with respect to the front and rear of a truck **80**. In a preferred embodiment the mounting rails **76** and **78** are aligned with the wheel base **82** of the rear wheels **84** of the truck **80** and are 2"×2" square beams. The first and second mounting rails **76** and **78** are mounted to a lower surface **86** of the truck bed **88** adjacent to and below an opening **90** cut into the truck bed **88** which receives the mounting plate **36**. Once the mounting plate **36** is placed within the opening **90** cut into the truck bed **88**, the front and rear edges of the mounting plate **36** are affixed to the first and second mounting rails **76** and **78** respectively by fasteners **92** such that the mounting plate **36** is mounted to the mounting assembly **74** flush within the bed **88** of the truck **80**.

The mounting plate assembly **10** also includes a locking pin assembly **94**. The locking pin assembly **94** includes an elongated handle **96**, a spring **98** and a locking pin **100** within a pin housing **102**. The locking pin housing **102** extends laterally into an upper portion of the hitch housing **64** offset with respect to the center vertical axis of the hitch housing **64**. The locking pin housing **102** extends through a side wall of the hitch housing **64** such that the locking pin **100**, when actuated by the spring **98** and the handle **96**, extends through the locking pin housing **102** into the hitch housing **64**. The locking pin **100** engages a tapered surface or recess of the hitch mount **32** in between the lower end of the hitch insert **16** and the upper end of the hitch mount **32** received within the hitch housing **64** to secure the hitch mount **32** housed within the hitch housing **64**. The handle **96** extends outwardly from the hitch housing **64** under the mounting plate assembly **34** between the mounting rails **76** and **78** to the exterior of the truck **80** over the rear wheel **84** of the truck **80** to permit actuation by the user.

In operation, an opening is cut into the bed **88** of a truck **80** sized to accommodate and receive the mounting plate **36**. The rails **76** and **78** are mounted to the underside of the truck's bed **88** and the outer frame **38** of the mounting plate **36** is placed within the opening in the truck bed **88** and affixed to the mounting assembly **74** by bolting the front and rear edges of the outer frame **38** of the mounting plate **36** to the first and second mounting rails **76** and **78** such that outer frame **38** of the mounting plate **36** is mounted to the truck flush with the truck's bed **88**. Thus, the hitch guide **50** forms a depression within the truck bed **88** for receiving the hitch insert **16** therein.

The hitch insert **16** is inserted into the hitch attachment **22** of a trailer **14** by inserting the insert bar into the trailer's hitch attachment **22** such that the hitch mount **32** extends downwardly from the lower end of the hitch insert **16** and the trailer **14**. After the insertion, holes of the hitch insert **16** are aligned with the insertion holes of the trailer **14**. Then a connection pin is inserted through the aligned holes of the hitch insert **16** and trailer hitch to secure the hitch insert **16** to the trailer hitch.

In order to secure the trailer **14** to the truck **80** using the hitch and mounting system **10**, the trailer **14** equipped as provided above is aligned with the mounting plate assembly **34** secured within the bed **88** of the truck **80** with the handle **96**. Specifically, the downwardly oriented hitch mount or ball is aligned at any point above the hitch guide surface of the mounting plate **36** and the handle **96** and spring **98** of the locking pin **94** assembly are actuated to retract the locking pin **100** from the hitch housing and leave the hitch housing clear of the locking pin **100** to receive the hitch mount. As the trailer **14** and hitch insert **16** are lowered, because of the frustoconical shape of the hitch guide **50** the hitch insert is guided into the centrally located hitch housing by the downwardly angled guide surfaces of the mounting plate assembly **34**. Once the hitch mount **32** has been guided into and retained within the hitch housing **64** at the center of the mounting plate **36** by the guide surface of the hitch guide **50**, the handle **96** of the locking pin assembly **94** is actuated. As a result the spring **98** within the locking pin housing **102** expands to advance the locking pin **100** from the locking pin housing **102** into the interior of the hitch housing in between the hitch mount **32** and the lower end of the hitch insert bar such that the extended locking pin **100** retains the hitch mount **32** securely housed within the hitch housing **64**.

Therefore, an adaptable and improved trailer hitch and mounting system **10** has been disclosed that provides an automatic, quick, and easy mounting connection between the trailer and the truck. The system **10** automatically guides the trailer hitch into a mounting connection with the truck **80** with a high margin of error. The system is sized to be used with and incorporated into a standard trailer **14** and attaches to the truck's frame mounted flush and disposed within the bed **88** of a truck **80** such that the truck bed **88** is left clear when the mounting system not in use. As a result, at the very least, the adaptable and improved trailer hitch and mounting system **10** meets all of its stated objectives.

It will be appreciated by those skilled in the art that other various modifications could be made to the device without parting from the spirit and scope of this invention. All such modifications and changes fall within the scope of the claims and are intended to be covered thereby.

What is claimed is:

1. A method of securing a trailer to a truck steps comprising:

providing a truck and a trailer in spaced relation to the truck;

engaging and moving a hitch insert assembly along an angled surface of a mounting plate assembly to guide the first coupling device to a hitch housing; and

locking the hitch insert assembly in place in the hitch housing to secure the trailer to the truck.

2. The method of claim **1** wherein the hitch insert assembly has a hitch insert that is secured to a hitch attachment of the trailer.

3. The method of claim 2 wherein the mounting plate assembly is disposed within a bed of the truck and having a hitch guide that has the angled surface that is engaged by the hitch insert assembly.

4. The method of claim 3 wherein the hitch guide has a frustoconical shape.

5. The method of claim 3 wherein the hitch insert has a hitch mount that engages the angled surface of the hitch guide.

6. The method of claim 5 where the hitch mount is a ball mount.

7. The method of claim 5 wherein the hitch guide has an opening disposed therethrough and the hitch mount is disposed through the opening when the first coupling device is in the hitch housing.

8. A trailer hitch and mounting system comprising:

a hitch insert assembly attached to a hitch attachment of a trailer and having a hitch mount;

a mounting plate assembly having a mounting plate secured within a bed of a truck; and

wherein the mounting plate assembly has a hitch guide with an angled surface that receives and is engaged by the hitch mount to guide the hitch mount toward an opening in the hitch guide;

wherein a hitch housing is disposed within the opening to receive the hitch mount.

9. The system of claim 8 wherein the mounting system has first and second mounting rails that are mounted to the bed of the truck.

10. The system of claim 8 wherein the hitch guide has a frustoconical shape.

11. The system of claim 8 wherein the mounting plate assembly has a locking pin assembly that extends laterally into an upper portion of the hitch housing.

12. The system of claim 11 wherein the locking pin assembly has a locking pin that engages a tapered surface or recess of the hitch mount.

13. The system of claim 11 wherein the pin assembly has a handle that extends outwardly to the exterior of the bed of the truck.

* * * * *